

- Question 3 (roulette)

Suppose that you are at a casino playing roulette. The strategy you are using is to, before each bet, flip a coin to determine whether to place your bet on red or on black (which, according to the rules of the game, should each have almost a 50% chance of occurring). After you've placed each bet, the roulette wheel is then spun. Suppose that you lose 59 times in a row (i.e. for 59 consecutive plays, when you place your bet on black the ball then lands on red, and when you place your bet on red the ball then lands on black).

From this experience, it is most rational to conclude that:

a) Using a coin toss to determine whether to bet on red or black is in general a very bad strategy for playing roulette b) The game is somehow rigged against you and the casino or its employees are cheating you c) You are very likely to win on your next bet if you continue this coin flip based strategy d) The roulette game is broken, but there is no reason to assume that it was broken intentionally e) You were merely very unlucky f) One cannot reasonably conclude which of the above options is more likely

What are the chances of you losing 59 times in a row? Compare these chances to the odds of winning the NJ lotto (say 1/150M — use scientific notation). How many times do you need to lose before you suspect that something strange is going on? You should also explain why you rule out all other answers.

Answer:

The chance of losing 59 times is $(1/2 * 1/2 + 1/2 * 1/2)^{59}$

There is no limited time for losing. Cause the percentage of losing and winning in one game is 1/2. all the games are independent. Therefore, you cannot suspect something strange.

1) Using a coin toss to determine betting on black and red have the same percentage of directly bet. It cannot say a bad or worse strategy.

b) Cause the games have the probability to win and lose. You cannot say employees cheat you.

c) the percentage of flip a coin strategy are independent and same for each games.

d) roulette game is broken, it is probably intent or not.

e) probably yes, probably not.

Question 5 (risk): Let's make the game very specific:

There are only 2 outcomes: you either win \$1 with probability 999/1000 or you lose \$200 with probability 1/1000.

It takes 1' (minute) to play each round. You can play 60 rounds/hour and you can play as long as you want.

What are E(xpectation) and s (standard deviation) of playing this game once? Of playing for 1/hr?

Would you play?

Answer:

$$N = 1, E(x) = 1*999/1000 - 200*1/1000 = 0.799$$

$$N= 60 E(x) = 60*(1*999/1000 - 200*1/1000)= 47.9$$

Yes, I will play around over 1h. Based on the data, if I play over 1 h, I might will win 47.9.

[8] Valuation (Analysts Only) For the current year, company XYZ earned EBITDA of \$350M. Their depreciation/amortization expense was \$125M, interest expense was \$75M, and tax rate was 21%. Their current market cap is \$1,350M. For the following year, company XYZ has given EBITDA guidance of \$550M. Their depreciation/amortization expense, interest expense, and tax rate will remain the same.

1. Show your steps in calculating net income for the current year and the trailing P/E ratio.

Answer:

EBITDA	\$350
<u>-D&A</u>	<u>\$125</u>
EBIT	\$225
<u>-Interest</u>	<u>\$75</u>
EBT	\$150
<u>-Tax</u>	<u>31.5 (21%*150)</u>
NET income	\$118.5 Million

$$PE \text{ Ratio} = \text{Market Cap} / \text{EBITDA} = 1350/350 = 3.86$$

2 Show your steps in calculating net income for the following year and the forward P/E ratio.

EBITDA	\$550
<u>-D&A</u>	<u>\$125</u>
EBIT	\$425
<u>-Interest</u>	<u>\$75</u>
EBT	\$350
<u>-Tax</u>	<u>73.5 (21%*350)</u>
NET income	\$276.5 Million

Forward PE Ratio = Current Share Price / Estimated Future Earnings per Share

Market Cap = share price * shares outstanding

Estimated future earning per share = EBITDA/ shares outstanding

Forward PE Ratio = Market Cap / EBITDA(following years)

Forward PE Ratio = $1350/550 = 2.45$

3. What rate of return does the forward P/E ratio from question 2 correspond to?

$550 = 350(1+r)$ $r = 0.57$